

REMARKS

STATUS OF THE CLAIMS

Claims 39-41 and 46-78 were pending in this application. Claim 58 was amended. Claim 59 was amended.

INTERVIEW SUMMARY

On August 11, 2005, Applicant Robert Otillar had a telephone interview with Examiner Ludlow. The parties discussed the restriction requirement issued. The Applicant noted that it seemed that Examiner Ludlow may have been referring to a different version of the specification than was actually filed since some of the paragraph numbers referred to by the Examiner seemed different than those in the specification as filed. In addition, the Applicant noted with regard to the Examiner's 35 USC 112, first paragraph rejections that a number of the terms that the Examiner identified as missing from the specification were actually present in the specification (the relevant sections are set forth below). In addition, the parties discussed the differences between the present invention and Zhou and Burdon. No claim amendments were discussed with regard to these references, but instead the Examiner suggested that the Applicant respond by setting forth in his response the arguments discussed on the phone.

RESTRICTION REQUIREMENT

The Examiner withdrew Claims 59-73, 76, and 78 as being drawn to a non-elected invention. The Examiner suggested in the interview of August 11, 2005 that the Applicant could overcome the restriction requirement, and avoid having Claims 59-73, 76, and 78 withdrawn from the application by adding an element directed to detection to Claim 59, similar to the detection element of Claim 39. The Applicant has added that detection element to Claim 59. Thus Applicant respectfully requests that the restriction requirement on Claims 59-73, 76, and 78 be withdrawn.

REJECTIONS UNDER 35 U.S.C. § 112, FIRST PARAGRAPH

Claims 39-58, 74-75, and 77 were rejected under 35 U.S.C. 112, first paragraph, as allegedly failing to comply with the written description requirement.

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With regard to Claim 39-58, the Examiner stated that there is no teaching that the number of attracted particles is discrete and predetermined, and the Examiner stated that the word discrete does not appear "anywhere in the application as filed." Applicants respectfully disagree. First, the term "discrete" does appear in the application as filed, specifically at paragraph [0080]. In addition, the concept that the number of attracted particles is discrete and predetermined is discussed throughout the specification as filed. The support for the concept of "discrete" was discussed in the interview of August 11, 2005 and Applicant explained the concept behind this terminology. Support for this concept is discussed again here: For example, at paragraph [0136], the application discusses control mechanisms for localizing particles to locations beyond just to a crater, and discusses multiple, individually controllable, particles near a location (e.g., a crater or other location) and controlling the motion of each particle individually. Paragraph [0138] discusses passing an isolated particle vertically between two locations (coils). Paragraph [0139] discusses de-clumping for facilitating the separation of clumped particles. Paragraph [087] discusses the control of motion of individual lids, and discusses one element controlling the motion of a plurality of lids. Paragraph [0012] discusses individually controllable lids (explicitly mentioning non-particle lids). Paragraph [0126] discusses the alteration of the surface structures/patterning to control the localization and motion of particles. Paragraph [0138] discusses passing an isolated particle between to adjacent (e.g. horizontally adjacent & touching) locations. In embodiments where a known particle is controllably moved, localized, etc., it is inherent that that particle (being known before it is localized) is predetermined as the particle that will be so localized. Thus, the specification provides numerous teachings regarding the number of attracted particles being discrete and predetermined.

The Examiner also stated that "low power consumption" in Claims 48 and 57 was not disclosed in the application as filed. Applicant respectfully disagrees. The Examiner admitted that permanent magnets are low power. Paragraph [0130] states that "[i]n one aspect, low-power versions are intended to enable portability." In a low power version generating a uniform field, it is reasonable to see embodiments where a uniform field generated by that version would be low power. Paragraph [0122] further notes that "[c]onsideration of power-consumption...can be

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important." Thus, the concept of "low power consumption" is disclosed throughout the specification as filed. The Applicants respectfully submit that the uniform magnetic fields are commonly taught in undergraduate university physics and engineering classes. Given the requirements of low power consumption and a uniform magnetic field disclosed in the specification, one of ordinary skill will readily appreciate numerous variations of the invention that comprise a "uniform magnetic field of low power consumption". This is especially evident in light of the broad range of magnet configurations provided for realizing the invention (e.g. "integrated", "external"[0015], "coil"[0011], "magnetically active material"[0014], "individually controllable" [0040], "around each crater" [0040], "position[ed]" [0044], "varia[ble]" [0048]", "alternating" [0048], "counteracting" [0050], "current-controlled"[0062], "attracting" [0063], etc., etc.), and the guidance for design and engineering present throughout the specification.

Thus, the Applicants respectfully request that the objections to Claims 48 and 57 be withdrawn.

Regarding Claim 50, the Examiner further stated that there is no support in the specification as filed for using pH, optical, radiation, temperature, or pressure sensors to detect the number of particles. The Applicants respectfully disagree; as shown below, these sensors are disclosed, the aim of detecting the number of particles is disclosed, and the use of the sensors for realizing such aims is disclosed.

pH, optical, radiation, temperature, pressure sensors, and a range of other sensors are taught in multiple locations in the specification (e.g. [0099], [0056], [0037], [0100], etc.).

Paragraph [0060] discusses determining the number of spheres in a well, and paragraph [0051] notes determining the number of particles captured in a well. Paragraph [0020] notes having a known number of samples in a well, and paragraph [0016] discusses keeping track of the number of samples passing into or out of a well. Paragraph [0063] discusses detecting when a particle is in the capped position, or when a pocket is filled (e.g. determination of localization of one particle or not one particle). (Using various sensing, including inductance and "various other schemes" including optical or capacitance). The connection from paragraph [0063] to [0064] teaches the option of using same or similar sensing means for quantifying the number of capped position (e.g. 0-1) or smaller sample particles in a well (0-N). Paragraph [0072] discusses

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acoustic means for detecting the number of localized particles, and paragraph [0076] discusses acoustic means for detecting “the number of reactions” that took place at each site, the number of reactions being determined by the number of particles localized at a site.

The specification discloses the use of the desired sensor (e.g. pH, optical, radiation, temperature, or pressure sensors) for realizing aims of the invention (e.g. [0094]).

Hence the sensors, aims, and combination of these are disclosed in the specification as filed. Thus, Applicants respectfully submit that the application does support “using pH, optical, radiation, temperature, or pressure sensors to detect the number of particles.” Applicants respectfully request that the objection to Claim 50 be withdrawn.

Regarding Claim 51, the Examiner states’ “under..”, “above...”, “between...”, “operably connected...”, and “combinations thereof” are not supported by the application as filed.’ The Applicant respectfully disagrees; the application explicitly discloses sensors positioned, e.g., “under” [0110], “adjacent” [0111], “surround[ing]” [0112], “in floor and wall” [0113], “in several walls” [0113], “adjacent” [0113], “below” [0114], “above” [0114], “between” [0117], and in other positions and configurations ([0110-0117] and elsewhere in the specification).

Regarding Claim 53 and 55, see above regarding Claims 39-58.

Regarding Claim 54, the Examiner states that “regulating the number...by repelling” lacks support in the application as filed. The Applicants respectfully disagree, and ask that the objection to Claim 54 be withdrawn; the “repelling” is disclosed, e.g. “a magnetic coil...can be used to retain or repel” particles [0136]; an element “can be used to attract or repel a particle. ... Particles other than lids may be controlled and passed to or removed from a crater or other location in a similar fashion” [0136].

Regarding Claim 58, the phrase “battery-powered” is changed to “portably-powered” [0130], following the Examiner’s suggestion in the interview of August 11, 2005. In the current Office Action, the Examiner stated that “a uniform field generated by a ‘battery-powered device’ is not found in the application as filed.” In the interview of August 11, 2005, the Applicant identified to the Examiner that “portably powered” versions of the invention were disclosed in the specification [0130], and that one of ordinary skill would appreciate that a device “portably

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powered" or powered by a "portable computing system" [0130] would include "battery powered" cases (see also the references, e.g. Madou ("Integrated Power" section) [0100]). Hence, Applicants respectfully request that the rejection of Claim 58 be withdrawn.

Regarding Claim 75, the Examiner states "Claim 75 is not supported as filed in that there is no discussion of "a substantial distance" relative to "radius." Applicants note that the concept of effective radius is disclosed at paragraph [0140]. Applicants note that a "substantial" distance as in Claim 75 is directed to capture "a distance that is not small when compared to a measure of the size of the particle;" the concept of "radius" serves to further clarify "substantial distance." Applicants note that the motion of particles over a distance that is not small compared to the size of the particle is disclosed throughout the specification, e.g. [0019], [0136], [0141]. Hence, Applicants respectfully request that the objection to Claim 75 be withdrawn.

Applicants submit that the claims as amended are in compliance with 35 U.S.C. 112, first paragraph. Applicants request withdrawal of this rejection with regard to the amended claims.

OBJECTIONS UNDER 35 U.S.C. § 132

The Examiner objected to the Amendment filed by Applicants on December 13, 2004 under 35 U.S.C. 132 as allegedly introducing new matter into the disclosure. The Examiner stated that the "added material which is not supported by the original disclosure is as explained above" (e.g., rejections under 35 U.S.C. 112, first paragraph). Applicants respectfully disagree, and the reasons for disagreement are discussed at length above. Applicants thus respectfully request withdrawal of this objection with regard to the amendment.

In addition, the Examiner suggested that the Applicant review the specification as filed prior to filing a response and pointing out where support is found for each amendment. The Examiner further stated that "Claim 52 finds support at [0148]." However, the Applicants respectfully note that the specification as filed does not include a paragraph [0148] (e.g., see the USPTO on-line file wrapper version of the specification). In specification as filed, the last paragraph of the specification is paragraph [0142]. The Applicants respectfully submit that the support for amendments provided in the previous response was accurate. The Applicant thanks the Examiner for this suggestion and the Applicant has made efforts to ensure the support set

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forth herein is well-founded. As per the interview of August 11, 2005, the Applicants further acknowledge that the published version of the specification on the USPTO website (e.g., USPTO online specification version/document # 20030012693) does contain a section [0148]; the Applicant's response is numbered according to the specification as filed (e.g., USPTO website file-wrapper numbering).

REJECTIONS UNDER 35 U.S.C. § 103

Claims 39-41, 46, 58, 74-75, and 77 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Zhou in view of Burdon. Applicants respectfully disagree with this rejection.

Three requirements must be met for a prima facie case of obviousness. First, the prior art references must teach all the limitations of the claims. Second, there must be a motivation to modify the references or combine the teachings to produce the claimed invention. Third, a reasonable expectation of success is required. The teachings or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The cited art does not teach all of the limitations of the claims. The Examiner admitted that Zhou fails to teach "detection of the number of magnetic particles at each site." Thus, Zhou fails to teach "detecting, at one or more of the activated locations, the number of particles attracted to the location" recited in claim 39.

Burdon fails to remedy this deficiency. As the Examiner admits, Burdon does not teach "the detecting and electromagnets used in proximity to the same cavity." Examiner did not cite any other reference that teaches this and the Examiner did not explain how "the detecting and electromagnets used in proximity to the same cavity" is obvious. The Examiner stated that "Burdon teaches a method of moving fluid through a microfluidic device including a cavity 204 surrounded by coil 202 for detecting inductance of magnetic particles entering the cavity." Applicants respectfully disagree. Burdon addresses "the detection of the presence or absence of the fluid medium," but not "the moving of fluid ... for detection of the magnetic particles."

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Burdon states that as "the number of magnetic microspheres in cavity 204 also rises...the inductance of coil 252 can be used to sense the presence or absence of fluid flowing through channel 254" (col. 20, lines 26-27, lines 29-30). Nowhere does Burdon teach "detecting, at each activated location, the number of particles attracted to the location" of Claim 39. In addition, nowhere does Burdon teach "detecting, at one or more of the activated locations, the number of particles attracted to the location, wherein the number of attracted particles is discrete and predetermined" of Claim 39. Furthermore, Burdon fails to teach "selectively activating one or more of said force transducing elements" and Burdon does not teach any generation of a field or any generation of a field to attract one or more particles to a specific location.

In addition, the combination of Zhou and Burdon does not teach all of the elements of amended Claim 59. Again, this combination fails to teach the detecting step of claim 59 for at least the reasons described above with regard to the detecting step of claim 39. As another example of the deficiencies of this combination of references, Burdon and Zhou fail to teach "providing a substantially uniform magnetic field." Furthermore, Burdon does not teach "controllably localizing one or more particles to the specific locations by activating the selected force transducing elements to transduce a motive force to one or more particles proximal to the corresponding specific location."

Thus, the cited combination of references fails to teach all of the elements of the claims.

The cited art does not provide a motivation to modify the references or combine the teachings to produce the claimed invention and one of ordinary skill in the art would have had no reasonable expectation of success in the combination. Nowhere is there a motivation to combine or modify Zhou and Burdon to produce the claimed invention. Burdon states that "(f)or inductive sensing, the magnetic microspheres are added to the fluid ... to give the fluid a high magnetic permeability. In this way, the presence or absence of fluid can be detected." (col. 20, lines 17-21). Thus, Burdon is teaching away from detecting the number of particles attracted to a location. Burdon cannot in hindsight be combined with Zhou to provide teachings that Burdon specifically teaches away from.

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Further Burdon states that "etching processes are not typically able to form the complex three-dimensional structures and embedded structures that are often desirable in microfluidic devices." (Col. 1 Lines 34-37.). In addition, Burdon states that the disclosed device is "formed from a plurality of green-sheet layers sintered together" (Col. 2 Lines 9-12). Hence, Burdon teaches away from the etching techniques described in Zhou (e.g. Col. 11 Line 61 to Col. 12 Line 5; Col. 12 lines 43-54; Col. 13 47-52). Thus, there is no motivation to combine Zhou and Burdon to product the claimed invention.

The Applicants also submit that it would be unlikely one of ordinary skill in the art to even attempt the difficult effort to apply the etching techniques of Zhou to disclosed device of Burdon. It is not likely that the Zhou techniques would even work with the Burdon device. Hence, Applicants respectfully submit that a reasonable expectation of success in combining Zhou and Burdon is lacking.

Additionally, the Examiner admits that "Zhou fails to teach detection of the number of particles at each site." But Burdon does not teach the detection of the number of particles, and it is not obvious that the invention of Burdon is even capable of counting individual particles. Given that Zhou does not teach the detection of the number of particles, and Burdon does not teach the number of particles, the Applicants respectfully submit that the combination of Zhou and Burdon cannot teach the detection of the number of particles.

The Examiner has not met the required specificity to establish a motivation to combine the references. The Examiner must show "reasons that the skilled artisans, confronted with the same problem as the inventor, and with no knowledge of the claimed invention, would select the elements from the cited prior art reference for combination in the manner claimed." *In re Rouffet*, 47 USPQ2d at 1458, 1453 (Fed. Cir. 1998).

Therefore, a *prima facie* case of obviousness is not made with respect to the cited references, and Applicants respectfully request that this ground of rejection be withdrawn.

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CONCLUSION

Withdrawal of the pending rejections and reconsideration of the claims as amended are respectfully requested, and a notice of allowance is earnestly solicited. If the Examiner has any questions concerning this Response, the Examiner is invited to telephone Applicant at (415) 317-2008.

Respectfully submitted,

R [REDACTED]
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Dated: August 11, 2005

Signed: [REDACTED]

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